Serial No.: 10/789,564
Amendment dated: 07/28/2006
Reply to Office Action of: 05/18/2006
Atty. Docket No.: JJK-0405 (P2003J035)

REMARKS

The Examiner will note that the dependency of claim19 has been changed to 18 as required. Claim 2 has been amended to delete the "such as, for example". This should overcome the rejection under 35 USC 112, second paragraph. Claim 1 has been amended to specify the VI and aniline point of the intermediate stream as supported on page 9, line 12 and line 20. The product is now defined as a naphthenic base oil having a VI less than about 85 as supported on page 4, lines 13-14. Claims 18 and 25 have been amended to include a minor change in claim language. No new matter has been introduced into either claim.

It is believed that the claims are now in proper form for allowance.

EXAMINER'S REJECTION OF CLAIMS 1-6

The Examiner rejected claims 1-6 under 35 USC 103(a) as being unpatentable over Morehead (US 4744884) in view of Powers (US 5976354), Morehead discloses a process comprising hydrotreating oil shale followed by a dewaxing step; followed by a hydrogenation step; followed by fractionation into one or more lubricating oil fractions (see Morehead, col. 5, lines 62-64, col. 6, lines 28-29, col. 7 lines 15-16, col. 10, lines 7-9 and 56-60).

Morehead does not disclose removing at least a portion of the heteroatom species and saturating at least a portion of aromatics in the first hydrotreating stage and removing at least a portion of the heteroatom species in the hydrotreating step after dewaxing. Morehead also does not disclose stripping the effluent from the first hydrotreating step to obtain an intermediate stream.

However, Powers discloses that the hydrotreated stream from the first step is stripped (see Powers, col. 1, lines 44-50).

Powers discloses that the hydrotreated stream is stripped to remove hydrogen sulfide and ammonia (see Powers, col. 1 lines 44-50).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the process of Morehead to include that the hydrotreated material from the first step is stripped in order to remove hydrogen sulfide and ammonia.

Also, Powers discloses saturation of aromatic and the removing of heteroatoms in the first hydrotreating step (see Powers, col. 3, lines 1-3 and 30-40).

Powers discloses that aromatics saturation improved base oil stability (see Powers, col. 2, lines 65-67).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the process of Morehead to include saturation of aromatics and the removing of heteroatoms in order to improve base oil stability.

APPLICANTS' RESPONSE

Applicants' invention differs in several important aspects from that of Morehead cited by the Examiner as the primary reference.

1. The lubricating oils of Morehead have a VI greater than 95 (see Abstract). Applicants' invention as set forth in the amended claims 1-6 is directed to naphthenic base oils having a VI less than 85.

2. In order to achieve lubricating oils having a VI >95, Morehead states that it is essential that the polynaphthenic compounds be substantially hydrocracked (col. 12, lines 48-51). Thus Morehead is getting rid of polynaphthenic compounds which contribute to or cause a low viscosity index (col. 11, lines 60-62). In contrast, applicants' process produces a naphthenic base oil that has a VI that is outside the teachings or Morehead.

3. Powers is relied on to show stripping of the hydrotreated stream to remove hydrogen sulfide and ammonia and to saturate aromatics in the first hydrotreating step. Powers is directed to producing a lube oil stock. There is no indication in Powers of the VI and aniline point of the intermediate stream. Furthermore, the hydrotreated stream from Morehead have VI much higher than the intermediate stream in step b) of applicants' amended claim 1 as shown in Morehead, Table II. Merely stripping the hydrotreated stream of Morehead using the stripping step of Powers will not reduce the VI of Morehead's hydrotreated stream to those specified in step b) of applicants' amended claim 1.

Therefore, for the reasons noted above, the combination of Morehead and Powers could not render obvious to one of ordinary skill in the art the process set forth in applicants' amended claims 1-6.

THE EXAMINER'S REJECTION OF CLAIM 2

With respect to claim 2, Morehead in view of Powers disclose everything in claim 1, but Morehead does not disclose where the feedstock is a mixture of several less desirable refinery streams.

However Powers discloses where the feed is a mixture of vacuum gas oils (see Powers, col. 1, lines 5-11).

Powers discloses that lube oils are normally manufactured from these feeds (see Powers, col. 1, lines 5-11).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the process of Morehead to include where the feed is a mixture of vacuum gas oils because lube oils are normally manufactured from these feeds.

APPLICANTS' RESPONSE

Powers discloses that lube oils are manufactured from his feeds. However, as noted above, applicants' amended claims are directed to naphthenic oils having a VI less than 85 and this is not suggested by Powers or Morehead. Moreover, claim 2 is dependent on claim 1 and is therefore patentable for the reasons noted above.

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THE EXAMINER'S REJECTION OF CLAIM 3

With respect to claim 3, Morehead discloses dewaxing at temperatures between 650 and 800°F (343-427°C), pressures between 500 and 2500 psig, LHSV between 0.1 and 5.0, and hydrogen treat gas rates between 4,000 and 20,000 scf/b (see Morehead, col. 7, Table VI).

APPLICANTS' RESPONSE

Even if Morehead discloses dewaxing conditions as cited by the Examiner, claim 3 is dependent on claim 2 which is dependent on 1 and is patentable for the reasons noted above in applicants' response to the rejection of claim 1-6.

THE EXAMINER'S REJECTION OF CLAIM 4

With respect to claim 4, Morehead discloses dewaxing catalysts that are zeolites formed from silica and alumina and have 10 rings (see Morehead, col. 7, lines 63 - col. 8, line 6).

APPLICANTS' RESPONSE

Even if Morehead discloses dewaxing catalysts as cited by the Examiner, Claim 4 is dependent on claims 2 and 3 which are dependent on 1 and therefore claim 4 is patentable for the reasons noted above in applicants' response to the rejection of claim 1-6.

THE EXAMINER'S REJECTION OF CLAIM 5

With respect to claim 5, Morehead discloses hydrotreating at temperatures between 315 and 427°C (600-800°F) and pressures between 500 and 2500 psig (see Morehead, col. 10, Table VII).

APPLICANTS' RESPONSE

Even if Morehead discloses hydrotreating conditions as cited by the Examiner, claim 5 is dependent on claims 2 and 3 which are dependent on 1 and therefore claim 5 is patentable for the reasons noted above in applicants' response to the rejection of claim 1-6.

THE EXAMINER'S REJECTION OF CLAIM 6

With respect to claim 6, applicants admit in the specification that conventional hydrotreating catalysts typically include 2-20 wt.% of a Group 8-10 metal and 5-50 wt.% of a Group 6 or 16 metal (see Specification, page 13, paragraph 24).

APPLICANTS' RESPONSE

Applicants' claim 6 is directed to conventional hydrotreating catalysts. However, claim 6 is dependent on claim 5 and claim 5 is dependent on claims 2 and 3 which are dependent on 1 and therefore claim 6 is patentable for the reasons noted above in applicants' response to the rejection of claim 1-6.

THE EXAMINER'S REJECTION OF CLAIMS 7-12

Claims 7-12 are rejected under 35 USC 103(a) as being unpatentable over Morehead in view of Powers as applied to claims 1-6 above, and further in view of Chen (US 4944962). Morehead in view of Powers discloses everything in claims 1-6 (see paragraphs 8-13) and Morehead discloses where the feed to the dewaxer contains between 300 and 200 ppm of sulfur (see Morehead, col. 6, line 62-66), but does not disclose where the intermediate stream has an API of about 22 to about 27, a viscosity of about 10 to about 15 at 40°F, a VI of about -20 to about -5, a 5%LV of about 380 to about 405°F, an aniline point of about 130 to about 160°F, and a 95%LV of about 800 to about 1000°F.

However, Chen discloses an intermediate feed to a dewaxing zone with an API of 29.7, a viscosity at 40°F of 7.39, a 5%LV of 544°F, an aniline point of 175°F, and a 95%LV of 775°F (see Chen, col. 18, lines 38-68, Fig. 2 and MPEP 2144.05 I and since the range of kinematic viscosity is disclosed and the viscosity index is a function of kinematic viscosity, the stream in Chen should have the same viscosity index).

Chen discloses that the addition of the intermediate feed to a dewaxing zone upgrades the operation of the catalytic dewaxer (see Chen, col. 11, lines 39-50).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the process or Morehead in view of Powers to include an intermediate feed to a dewaxing zone with an API of 29.7, a

viscosity at 40°F of 7.39, a 5%LV of 544°F, an aniline point of 175°F, and a 95%LV of 775°F in order to upgrade the operation of the catalytic dewaxer.

APPLICANTS' RESPONSE

Claims 7, 9 and 11 are dependent on claim 6. Claims 8, 10 and 12 are dependent on claim 7. Thus all of claims 7-12 are ultimately dependent on claims which are dependent on claim 1. These claims are patentable for the reasons noted above in applicants' response to the rejection of claim 1-6.

Furthermore, in stating that Chen discloses applicants' range of kinematic viscosity and viscosity index is a function of kinematic viscosity, the Examiner concludes that the stream of Chen should have the same VI as applicants' intermediated stream.

Applicants disagree with the Examiner's conclusion regarding the presumed VI of Chen. Viscosity Index is a measure of the change of viscosity of an oil as a function of temperature and is determined by measuring viscosity at two different temperatures, typically 40 and 100°F. VI cannot be determined from a single viscosity value as suggested by the Examiner. Thus the Examiner's premise concerning the VI of oils disclosed by Chen is incorrect as Chen discloses only a single value of viscosity.

THE EXAMINER'S REJECTION OF CLAIMS 13-14

With respect to claims 13 and 14, Morehead discloses where there is a fractionation step after the hydrogenation step that produces three oil fractions (see Morehead, col. 10, lines 56-60 and Figure).

APPLICANTS' RESPONSE

The fractions disclosed by Morehead in the passage cited by the Examiner relate to lubricating oils having a VI >95, not naphthenic oils having a VI of <85 as set forth in amended claim 1. Moreover, claims 13-14 ultimately depend on claim 1 which is patentable over Morehead for the reasons set forth above in applicants' response to the rejection of claims 1-6.

THE EXAMINER'S REJECTION OF CLAIMS 15-17

Claims 15-17 are rejected under 35 USC 103(a) as being unpatentable over Morehead in view of Power and Chen as applied to claims 1-11 above, and further in view of Souillard (US 3878115). Morehead discloses a product fraction having a viscosity between 21.83 and 29.54 cSt (SSU = cSt*4.55) at 40°C, but Morehead in view of Powers and Chen do not disclose a second fraction with a viscosity between about 700 SSU to about 800 SSU at 100°F and a third fraction with a viscosity between about 1100 SSU to about 1300 SSU at 100°F.

However, Souillard discloses naphthenic base oil with a viscosity between 50 and 1000 SSU at 100°F (see Souillard, col. 2, lines 1-11 and MPEP §§ 2144.04 V C and 2144.05 I).

Souillard discloses that such base oils are preferable for use in lubrication compositions (see Souillard, col. 2, lines 1-11).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the process of Morehead in view of Powers and Chen to include naphthenic base oil with a viscosity between 50 and 1000 SSU at 100°F because such base oils are preferable for use in lubrication compositions.

APPLICANTS' RESPONSE

Claims 15, 16 and 17 are dependent on claims 2, 13 and 14 respectively. Claims 2 and 13-14 ultimately depend on claim 1 which is patentable over Morehead in view of Powers and Chen for the reasons set forth above. Moreover, Souillard discloses lubricating compositions having a Saybolt viscosity between 50 and 1000 SSU at 100°F but does not disclose the viscosity of the individual base oils set forth in claim 15-17. The upper range in claim 15 and the third base of claim 17 is outside the range disclosed by Souillard. Therefore, the cited combination does not render obvious the invention of amended claim 1.

THE EXAMINER'S REJECTION OF CLAIMS 18-24

Claims 18-24 are rejected under 35 USC 103(a) as being unpatentable over Morehead in view of Powers, Chen, Souillard, Clark (US 5273645) and Baker, Jr. (US 5951848).

With respect to claims 18, 19, 21, 22 and 24-26, Morehead discloses a process comprising hydrotreating oil shale followed by a dewaxing step; followed by a hydrogenation step; followed by fractionation into one or more lubricating oil fractions (see Morehead, col. 5, lines 62-64, col. 6, lines 28-29, col. 7 lines 15-16, col. 10, lines 7-9 and 56-60). Morehead discloses dewaxing at temperatures between 650 and 800°F (343-427°C), pressures between 500 and 2500 psig, LHSV between 0.1 and 5.0, and hydrogen treat gas rates between 4,000 and 20,000 scf/b (see Morehead, col. 7, Table VI). Morehead discloses dewaxing catalysts that are zeolites formed from silica and alumina and have 10 rings (see Morehead, col. 7, lines 63 - col. 8, line 6). Morehead discloses where the feed to the dewaxer contains between 330 and 2000 ppm of sulfur (see Morehead, col. 6, lines 62-66).

Morehead does not disclose where the feedstock is a mixture of several less desirable refinery streams and Morehead does not disclose removing at least about 50 vol.% of the sulfur heteroatom species, more than about 20 vol.% and saturating at least a portion of aromatics in the first hydrotreating stage and removing at least a portion of the heteroatom species in the hydrotreating step after dewaxing. Morehead also does not disclose stripping the effluent from the first hydrotreating step in a stripping column having at least one feed tray and al least one reflux tray wherein at least one intermediate stream characterized as having an API of about 22 to about 27, a viscosity of about 10 to 15 at 40°F, a VI of about -20 to about -5, a 5%LV of about 380 to about 405°F, an aniline point of about 130 to about 160°F, and a 95%LV of about 800 to about 1000°F is removed from the stripping column at a point between the feed tray and the reflux tray. Morehead also does not disclose a second fraction with a viscosity between about 700 SSU to about 800 SSU at 100°F and a third fraction with a viscosity between about 1100 SSU to about 1300 SSU at 100°F.

However, Powers discloses where the feed is a mixture of vacuum gas oils (see Powers, col. 1, lines 5-11).

Powers discloses that lube oils are normally manufactured from these feeds (see Powers, col. 1, lines 5-11).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the process of Morehead to include where the feed is a mixture of vacuum gas oils because lube oils are normally manufactured from these feeds.

Baker discloses hydrotreating prior to dewaxing to remove most of the sulfur and nitrogen heteroatoms (see Baker, col. 4, lines 26-48) and aromatics saturation of at least 60% (see Maker, col. 4, lines 26-31 and claim 1).

Baker discloses that heteroatoms and aromatics are removed to increase the viscosity index (see Baker col. 4, lines 26-35).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the process of Morehead to include hydrotreating prior to dewaxing to remove most of the sulfur and nitrogen heteroatoms and aromatics saturation of at least 60% in order to increase the viscosity index.

Powers also discloses that the hydrotreated stream from the first step is stripped (see Powers, col. 1, lines 44-50).

Powers discloses that the hydrotreated stream is stripped to remove hydrogen sulfide and ammonia (see Powers, col. 1 lines 44-50).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the process of Morehead to include that the hydrotreated material from the first step is stripped in order to remove hydrogen sulfide and ammonia.

Clark discloses a separation device with columns and trays (see Clark, col. 17, lines 19-32).

Clark discloses that such a separating device is often employed (see Clark, col. 17, lines 19-32).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the process of Morehead to include a separation device with columns and trays because such a device is often used.

Chen discloses an intermediate feed to a dewaxing zone with an API of 29.7, a viscosity at 40°F of 7.39, a 5%LV of 544°F, an aniline point of 175°F, and a 95%LV of 775°F (see Chen, col. 18, lines 38-68, Fig. 2 and MPEP 2144.05 I and since the range of kinematic viscosity is disclosed and the viscosity index is a function of kinematic viscosity, the stream in Chen should have the same viscosity index).

Chen discloses that the addition of the intermediate feed to a dewaxing zone upgrades the operation of the catalytic dewaxer (see Chen, col. 11, lines 39-50).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the process or Morehead in view of Powers to include an intermediate feed to a dewaxing zone with an API of 29.7, a viscosity at 40°F of 7.39, a 5%LV of 544°F, an aniline point of 175°F, and a 95%LV of 775°F in order to upgrade the operation of the catalytic dewaxer. It would also be obvious to remove the intermediate stream at a point on the stripping column to achieve the above intermediate stream specifications.

Souillard discloses naphthenic base oil with a viscosity between 50 and 1000 SSU at 100°F (see Souillard, col. 2, lines 1-11 and MPEP §§ 2144.04 V C and 2144.05 I).

Souillard discloses that such base oils are preferable for use in lubrication compositions (see Souillard, col. 2, lines 1-11)

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the process of Morehead in view of Powers and Chen to include naphthenic base oil with a viscosity between 50 and 1000 SSU at 100°F because such base oils are preferable for use in lubrication compositions.

APPLICANTS' RESPONSE

Applicants' invention differs in several important aspects from that of Morehead.

1. The lubricating oils of Morehead have a VI greater than 95 (see Abstract). Applicants' invention as set forth in the amended claims 1-6 is directed to naphthenic base oils having a VI less than 85.

2. In order to achieve lubricating oils having a VI >95, Morehead states that it is essential that the polynaphthenic compounds be substantially hydrocracked (col. 12, lines 48-51). Thus Morehead is getting rid of polynaphthenic compounds which contribute to or cause a low viscosity index (col. 11, lines 60-62). In contrast, applicants' process produces a naphthenic base oil that has a VI that is outside the teachings or Morehead.

3. Powers is relied on to show stripping of the hydrotreated stream to remove hydrogen sulfide and ammonia and to saturate aromatics in the first hydrotreating step. Powers is directed to producing a lube oil stock. There is no indication in Powers of the VI and aniline point of the intermediate stream. Furthermore, the hydrotreated stream from Morehead have VI much higher than the intermediate stream in step b) of applicants' amended claim 1 as shown in Morehead, Table II. Merely stripping the hydrotreated stream of Morehead using the stripping step of Powers will not reduce the VI of Morehead's hydrotreated stream to those specified in step b) of applicants' amended claim 1.

4. Applicants' process is directed to making at least two naphthenic base oils, not the lubricating oils of Morehead and Powers.

5. The Examiner cites Baker as disclosing that heteroatoms and aromatics are removed to increase VI. This teaching is away from applicants' naphthenic base oils having a VI <85. Increasing VI will not lead to the presently claimed naphthenic base oils.

6. The passage of Clark (col. 17, lines 19-32) cited by the Examiner discloses the use of various columns used in solvent extraction. Claim 18 specifies that an intermediate stream is removed at a point between the feed tray and the reflux tray. Clark is silent as to this point.

7. Applicants disagree with the Examiner's conclusion regarding the presumed VI of Chen. Viscosity Index is a measure of the change of viscosity of an oil as a function of temperature and is determined by measuring viscosity at two different temperatures, typically 40 and 100°F. VI cannot be determined from a single viscosity value as suggested by the Examiner. Thus the Examiner's premise concerning the VI of oils disclosed by Chen is incorrect as Chen discloses only a single value of viscosity.

8. Applicants have previously addressed the Souillard reference, and again note that Souillard does not disclose the separate naphthenic base oils set forth in step e) of claim 18.

For the reasons noted above, claims 18-24, specifically claims 18, 19, 21, 22 and 24-26 are patentable over Morehead in view of Powers, Chen, Souillard, Clark (US 5273645) and Baker, Jr. (US 5951848).

THE EXAMINER'S REJECTION OF CLAIMS 20 AND 27

With respect to claims 20 and 27, Morehead discloses hydrotreating at temperatures between 315 and 427°C (600-800°F) and pressures between 500 and 2500 psig (see Morehead, col. 10, Table VII) and applicant admits in the specification that conventional hydrotreating catalysts typically include 2-20 wt.% of a Group 8-10 metal and 5-50 wt.% of a Group 6 or 16 metal (see Specification, page 13, paragraph 24).

APPLICANTS' RESPONSE

Even if Morehead discloses hydrotreating conditions as cited by the Examiner, claims 20 and 27 are dependent on claims 18 and 25 and are patentable for the reasons noted above. Furthermore, claim 25 is directed to a process for producing at least three naphthenic base oils having different separate viscosity ranges as set forth in step e) which is outside the teachings of Souillard as noted above.

THE EXAMINER'S REJECTION OF CLAIM 23

With respect to claim 23, Applicant admits that fractionation typically results in bottoms fraction with a higher boiling point than the base oils and a lighter fraction boiling in the kerosene range (see Specification, page 15).

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APPLICANTS' RESPONSE

Applicants note that claim 23 also requires that fractionating said third stage effluent produces at least 3 base oils in addition to the fraction boiling higher than any of said three base oils and a fraction boiling in the kerosene range. This is not taught by the cited combination of references.

CONCLUSION

For the reasons set forth above, it is urged that applicants have made a patentable advance in the art over the cited references. Favorable action and early allowance is solicited. The Examiner is encouraged to contact applicants' attorney should the Examiner wish to discuss this application further.

Respectfully submitted:

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